Proton Power

April 26, 2016

Mr. John A. Trimmer, Chief
State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Pars Avenue, 15th Floor
Nashville, TN 37243

E-MAIL

Re: Construction Permit Application -210 Sam Rayburn Test Unit - Insignificant Activity

Dear Mr. Trimmer:

Enclosed for your review is a completed construction permit application for a proposed CHyP test unit to be operated at 210 Sam Rayburn Parkway, Lenoir City. The emissions estimated for this test unit meet the criteria as an insignificant activity. Proton Power, Inc. respectfully requests that this unit be exempt from construction permitting.

Should you have any questions, or need additional information please do not hesitate to contact me at 865-312-3859.

Sincerely,

Sally Almond, P.E.
Chemical Engineer/EHS Manager

Cc: Tawanna Reid – TDEC Environmental Consultant

Proton Power

Research and Development Facility
210 Sam Rayburn Parkway, Lenoir City, TN
April 25, 2016

1.0 Background

Proton Power Inc. (PPI) has recently acquired a new facility in Lenoir City located near the existing PPI offices and fabrication plant. Currently, this site is being used to warehouse equipment and assemble electrical panel boxes.

2.0 Project Description

PPI plans to install one of their CHyP units for the purpose of testing. This unit represents a new design in that the hot zone is constructed out of a material different that current units. The unit will operate in the same manner as the exiting CHyP units, where a woody biomass is fed into the system. The biomass is converted to gas and biochar in the hot pyrolysis zone. The CHyP gas produced in this test unit will be flared outside the building. The biochar will be collected and further tested for quality purposes.

3.0 Scope

The proposed CHyP unit represents a new design in that the hot zone is constructed out of a different material than the current units in operation. PPI is seeking permission to test this new design. The operation of this unit will be limited to one shift (8 hours), 7 days per week

Biomass processing will consist of drying wood chips and size reduction. The drying operation will be performed in Rockwood. The dried wood chips will be collected in open top drums, sealed, and transported to Rockwood. The dried wood chips will be processed in a crumbler to reduce the particle size to a smaller more uniform particle.

Material will be fed into the system manually with a hand held feed scoop. The CHyP gas produced from the process will be flared to the atmosphere. Biochar will be collected in a closed-vented drum. Process water condensate will be collected and placed in drums.

4.0 Emissions Estimates

The only pollutant generated from the material handling processes is particulate matter. For emission estimating purposed the emission factor for Particle Board Manufacturing 3.4 lb PM/ton (AP-42,Table 10.6.2-1) was selected as the basis for estimating emissions

from the crumbler. Particle board manufacturing uses wood shavings, flakes, wafers, chips, sawdust, stands, slivers, and wood wool.

- Crumbler operation
  - 200 lb/hr X 3.4 lb PM/ton X 1 ton/2000lb = **0.34 lbs PM/hr**
  - 0.34 lbs PM/hr X 8 hr/day X 365 day/yr X 1 ton/2000 lb = **0.496 tons/yr**

CHyP gas produced in the pyrolysis unit will be vented to the atmosphere and flared. Emissions of CO, NOx and VOCs are based on AP-42 emission factors for Industrial Flares, Chapter 13.5, Table 13.5-1. The heat value of CHyP gas is approximately 385 Btu/ft3 and a gas flow rate of 100 ft3/min was assumed. This represents a worst case gas flow rate. Carbon dioxide emissions are based on gas composition and gas flowrate.

- Flaring operation
  - 0.57 lbVOC/mmBtu X 385 Btu/ft3 X 100 ft3/min X 60 min/hr = **1.31 lb VOC/hr**
  - 1.31 lb VOC/hr X 8 hr/day X 365 day/yr X 1 ton/2000 lb = **1.92 ton VOC/yr**
  - 0.31 lbCO/mmBtu X 385 Btu/ft3 X 100 ft3/min X 60 min/hr = **0.71 lb CO/hr**
  - 1.31 lb CO/hr X 8 hr/day X 365 day/yr X 1 ton/2000 lb = **1.04 ton CO/yr**
  - 0.068 lbNOx/mmBtu X 385 Btu/ft3 X 100 ft3/min X 60 min/hr = **0.15 lbNOx/hr**
  - 0.15 lb NOx/hr X 8 hr/day X 365 day/yr X 1 ton/2000 lb = **0.22 ton NOx/yr**
  - 0.14 lbTHC/mmBtu X 385 Btu/ft3 X 100 ft3/min X 60 min/hr = **0.32 lb THC/hr**
  - 0.32 lb THC/hr X 8 hr/day X 365 day/yr X 1 ton/2000 lb = **0.47 ton THC/yr**
  - 177 ug/L soot X 1 lb/454 g X 100 ft3/min X1 L/0.0353 ft3 X 60min/hr =**0.066lb PM/hr**
  - 0.015 lb PM/hr X 8 hr/day X 365 days/yr X 1 ton/2000 lb = **0.10 ton PM/yr**
  - mass fraction of CO_2 in gas 0.204, CHyP gas density 0.056 lb/ft3; gas flow rate 100 ft3/min; 0.204 CO X 0.056 lb/ft3 X 100 cfm/min X 60 min/hr = 68.5 lb CO_2/hr
  - 68.5 lb/hr X 8 hr/day X 365 day/yr X 1 ton/2000 lb = **100 tons/ CO_2 yr**

5.0. Regulatory Review

Currently there are no air emission sources at this location.

The proposed test unit emissions are below the insignificant thresholds set forth in Tennessee APC 1200-03-09-.04(5)(f), as shown below, and are not expected to significantly impact ambient air quality.

6.0 Emissions Summary

Contaminate	Source	TPY
Carbon Monoxide	CHyP gas flare	1.04
Carbon Dioxide	CHyP gas flare	100
VOCs	CHyP gas flare	1.92
PM	Crumbler/flare	0.496/0.1
NOx	CHyP gas flare	0.22

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William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
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Telephone: (615) 532-0554

NON-TITLE V PERMIT APPLICATION
FACILITY IDENTIFICATION

Please type or print and submit in duplicate for each emission source. Attach appropriate source description forms.

SITE INFORMATION

1. **Organization's legal name**: Proton Power, Inc.		For APC use only	APC Company point no.
2. **Site name** (if different from legal name)			APC Log/Permit no.
3. **Site address** (St./Rd./Hwy.): 210 Sam Rayburn Parkway			County name: Roane
City or distance to nearest town: Lenoir City	Zip code: 37771		4. NAICS or SIC code: 2869
5. **Site location** (in lat. /long.)	Latitude: 35.888587		Longitude: -84.344142

CONTACT INFORMATION (RESPONSIBLE PERSON)

6. **Responsible person/Authorized contact**: Sally Almond			Phone number with area code: 865-312-3859
Mailing address (St./Rd./Hwy.): 487 Sam Rayburn Parkway			Fax number with area code
City: Lenoir City	State: TN	Zip code: 37771	Email address: salmond@protonpower.com

CONTACT INFORMATION (TECHNICAL)

7. **Principal technical contact**: same			Phone number with area code
Mailing address (St./Rd./Hwy.)			Fax number with area code
City	State	Zip code	Email address

CONTACT INFORMATION (BILLING)

8. **Billing contact**: Jane Sharp			Phone number with area code: 865-376-9002
Mailing address (St./Rd./Hwy.): 487 Sam Rayburn Parkway			Fax number with area code
City: Lenoir City	State: TN	Zip code: 37771	Email address: jsharp@protonpower.com

EMISSION SOURCE INFORMATION

9. **Emission source no.** (number which uniquely identifies this source): LC-01

10. **Brief description of emission source**: New design CHyP unit for testing

11. **Normal operation:**	Hours/Day: 8	Days/Week: 7	Weeks/Year: 52	Days/Year: 365
12. **Percent annual throughput**	Dec. – Feb.: 25	March – May: 25	June – August: 25	Sept. – Nov.: 25

(Over)

TYPE OF PERMIT REQUESTED

13. Operating permit ( )	Date construction started	Date completed	Last permit no.	Emission source reference number
Construction permit (X)	Last permit no.		Emission source reference number	

If you choose Construction permit, then choose either New Construction, Modification, or Location transfer

	New Construction (X)	Starting date May 15, 2016	Completion date
	Modification ( )	Date modification started or will start	Date completed or will complete
	Location transfer ( )	Transfer date	Address of last location

14. Describe changes that have been made to this equipment or operation since the last construction or operating permit application:

SIGNATURE

Based upon information and belief formed after a reasonable inquiry, I, as the responsible person of the above mentioned facility, certify that the information contained in this application and any attached application(s) is accurate and true to the best of my knowledge. As specified in TCA Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

15. Signature (application must be signed before it will be processed) Sam C Weaver, Pres.	**Date** 4/25/16

Signer's name (type of print)	**Title**	**Phone number with area code**
Sam C. Weaver	President	865-376-9002

Table of Pollution Reduction Device or Method Codes

Note: For cyclones, settling chambers, wet scrubbers, and electrostatic precipitators; the efficiency ranges correspond to the following percentages:
High: 95-99+%. Medium: 80-95% And Low: Less than 80%.
If the system has several pieces of connected control equipment, indicate the sequence. For example: 008'010.97%
If none of the below codes fit, use 999 as a code for other and specify in the comments.

No Equipment....000
Activated Carbon Adsorption....048
Afterburner – Direct Flame....021
Afterburner – Direct Flame with Heat Exchanger....022
Afterburner – Catalytic....019
Afterburner – Catalytic with Heat Exchanger....020
Alkalized Alumina....040
Catalytic Oxidation – Flue Gas Desulfurization....039
Cyclone – High Efficiency....007
Cyclone – Medium Efficiency....008
Cyclone – Low Efficiency....009
Dust Suppression by Chemical Stabilizers or Wetting Agents....062
Electrostatic Precipitator – High Efficiency....010
Electrostatic Precipitator – Medium Efficiency....011
Electrostatic Precipitator – Low Efficiency....012
Fabric Filter – High Temperature....016
Fabric Filter – Medium Temperature....017
Fabric Filter – Low Temperature....018
Fabric Filter – Metal Screens (Cotton Gins)....059
Flaring....023
Gas Adsorption Column -- Packed....050
Gas Adsorption Column – Tray Type....051
Gas Scrubber (General: Not Classified)....013
Limestone Injection – Dry....041
Limestone Injection – Wet....042
Liquid Filtration System....049
Mist Eliminator – High Velocity....014
Mist Eliminator – Low Velocity....015
Process Change....046
Process Enclosed....054
Process Gas Recovery....060
Settling Chamber – High Efficiency....004
Settling Chamber – Medium Efficiency....005
Settling Chamber – Low Efficiency....006
Spray Tower (Gaseous Control Only)....052
Sulfuric Acid Plant – Contact Process....043
Sulfuric Acid Plant – Double Contact Process....044
Sulfur Plant....045
Vapor Recovery System (Including Condensers, Hooding and Other Enclosures)....047
Venturi Scrubber (Gaseous Control Only)....053
Wet Scrubber – High Efficiency....001
Wet Scrubber – Medium Efficiency....002
Wet Scrubber – Low Efficiency....003
Wet Suppression by Water Sprays....061

Table of Emission Estimation Method Codes

Not application / Emissions are known to be zero....0
Emissions based on source testing....1
Emissions based on material balance using engineering expertise and knowledge of process....2
Emissions calculated using emission factors from EPA publications No. AP-42 Compilation of Air Pollution Emissions Factors....3
Judgment....4
Emissions calculated using a special emission factor different from that in AP-42....5
Other (Specify in comments)....6

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NON-TITLE V PERMIT APPLICATION
EMISSION POINT DESCRIPTION

Please type or print and submit in duplicate for each stack or emission source. Attach to the Non-Title V Facility Identification Form (APC 100).

GENERAL IDENTIFICATION AND DESCRIPTION

1. Organization name Proton Power, Inc		For APC use only	APC Company point no.
2. Emission source no. (As on Non-Title V Facility Identification Form) LC-01	Flow diagram point number		APC Log/Permit no.
3. Brief emission point description (Attach a sketch if appropriate): Proton Power plans to test a new design feature in one of it's CHyP units. This unit will be operated no more than one shift (8 hours). CHyP gas generated will be flared to the atmosphere. Biochar will be collected and tested for QA/QC purposes.			Distance to nearest property line (Ft.) 500

STACK AND EMISSION DATA

4. Stack or emission point data: →	Height above grade (Ft.) 8	Diameter (Ft.) 0.5	Temperature (°F) 150	% of time over 125°F 100	Direction of exit (Up, down or horizontal) horizontal
Data at exit conditions: →	Flow (actual $Ft.^3$/Min.) 100	Velocity (Ft. /Sec.)	Moisture (Grains/$Ft.^3$)		Moisture (Percent)
Data at standard conditions: →	Flow (Dry std. $Ft.^3$/Min.)	Velocity (Ft. /Sec.)	Moisture (Grains/$Ft.^3$)		Moisture (Percent)

5. Air contaminants	Actual emissions: Emissions (Lbs./Hr.) Average	Emissions (Lbs./Hr.) Maximum	Concentration	Avg. emissions (Tons/Yr.)	Emissions est. method code	Control devices *	Control efficiency%
Particulate matter	0.07	0.07	**	0.10	3	023	98
Sulfur dioxide (SO_2)			***				
Carbon monoxide (CO)	0.71	0.71	PPM	1.04	3	023	98
Organic compounds			PPM				
Nitrogen oxides (NO_X)	0.15	0.15	PPM	0.22	3	023	98
Fluorides							
Greenhouse gases (CO_2 equivalents)	68.5	68.5		100	2		
Hazardous air pollutant (specify)							
Hazardous air pollutant (specify)							
Other (specify) THC	0.32			0.47	3	023	98
Other (specify) VOCs	1.31			1.92	3	023	98
Other (specify)							

(Over)

6. Check types of monitoring and recording instruments that are attached: Opacity monitor ( ), SO_2 monitor ( ), NO_X monitor ( ), Other (specify in comments) ( )	
7. Comments	
8. Control device or Method code description:	Description of operating parameters of device (flow rate, temperature, pressure drop, etc.):

* Refer to the tables below for estimation method and control device codes.

** Exit gas particulate matter concentration units: Process – Grains/Dry Standard Ft^3 (70^0F), Wood fired boilers - Grains/Dry Standard Ft^3 (70^0F), all other boilers – Lbs. /Million BTU heat input.

*** Exit gas sulfur dioxide concentrations units: Process – PPM by volume, dry bases, and boilers – Lbs. /Million BTU heat input

Table of Pollution Reduction Device or Method Codes
(Alphabetical listing)

Note: For cyclones, settling chambers, wet scrubbers, and electrostatic precipitators; the efficiency ranges correspond to the following percentages:
High: 95-99+%. Medium: 80-95% And Low: Less than 80%.
If the system has several pieces of connected control equipment, indicate the sequence. For example: 008'010.97%
If none of the below codes fit, use 999 as a code for other and specify in the comments.

No Equipment....000
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Afterburner – Catalytic with Heat Exchanger....020
Alkalized Alumina....040
Catalytic Oxidation – Flue Gas Desulfurization....039
Cyclone – High Efficiency....007
Cyclone – Medium Efficiency....008
Cyclone – Low Efficiency....009
Dust Suppression by Chemical Stabilizers or Wetting Agents 062
Electrostatic Precipitator – High Efficiency....010
Electrostatic Precipitator – Medium Efficiency....011
Electrostatic Precipitator – Low Efficiency....012
Fabric Filter – High Temperature....016
Fabric Filter – Medium Temperature....017
Fabric Filter – Low Temperature....018
Fabric Filter – Metal Screens (Cotton Gins)....059
Flaring....023
Gas Adsorption Column -- Packed....050
Gas Adsorption Column – Tray Type....051
Gas Scrubber (General: Not Classified)....013
Limestone Injection – Dry....041
Limestone Injection – Wet....042
Liquid Filtration System....049
Mist Eliminator – High Velocity....014
Mist Eliminator – Low Velocity....015
Process Change....046
Process Enclosed....054
Process Gas Recovery....060
Settling Chamber – High Efficiency....004
Settling Chamber – Medium Efficiency....005
Settling Chamber – Low Efficiency....006
Spray Tower (Gaseous Control Only)....052
Sulfuric Acid Plant – Contact Process....043
Sulfuric Acid Plant – Double Contact Process....044
Sulfur Plant....045
Vapor Recovery System (Including Condensers, Hooding and Other Enclosures)....047
Venturi Scrubber (Gaseous Control Only)....053
Wet Scrubber – High Efficiency....001
Wet Scrubber – Medium Efficiency....002
Wet Scrubber – Low Efficiency....003
Wet Suppression by Water Sprays....061

Table of Emission Estimation Method Codes

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Judgment....4
Emissions calculated using a special emission factor different from that in AP-42....5
Other (Specify in comments)....6

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NON-TITLE V PERMIT APPLICATION
PROCESS OR FUEL BURNING SOURCE DESCRIPTION

Please type or print and submit in duplicate and attach to the Non-Title V Facility Identification Form (APC 100).

GENERAL IDENTIFICATION AND DESCRIPTION

1. Organization name Proton Power, Inc	For APC use only	APC Company – Point no.
2. Emission source no. (As on Non-Title V Facility Identification Form) LC-01		APC Log/Permit no.

3. Description of process unit

Proton Power has a new design feature in this CHyP test unit. The CHyP unit will be located at the new location, 210 Sam Rayburn Parkway, Lenoir City. CHyP gas produed from the pyrolysis unit will be flared to the atmosphere. Biochar produced from the operation will be test for quality control purposes and sold.

PROCESS SOURCE DESCRIPTION AND DATA

4. Type of source	(Check only one option below)
Process Source: Apply for a separate Permit for each source. (Check at right and complete lines 5, 6, and 11)	( )
Process Source with in process fuel: Products of combustion contact materials heated. Apply for a separate permit for each source. (Check at right and complete lines 5, 6, and 8 through 11)	( )
Non-Process fuel burning source: Products of combustion do not contact materials heated. Complete this form for each boiler or fuel burner and complete a Non-Title V Emission Point Description Form (APC 101) for each stack. (Check at right and complete lines 7 to 11)	(X)

5. Type of operation:	Normal batch time	Normal batches/day
Continuous ( ) Batch (X)	8 hours	1

6. Process material inputs and In-process solid fuels	Diagram reference	Input rates (pounds/hour) Design	Actual
A.			
B.			
C.			
D.			
E.			
F.			
G.			
Totals			

*** A simple process flow diagram must be attached.**

(Over)

BOILER, BURNER, GENERATOR, OR SIMILAR FUEL BURNING PROCESS DESCRIPTION

7. Boiler or burner data: (Complete lines 7 to 11 using a separate form for each boiler, burner, etc.)

Number	Stack number**	Type of firing***	Rated horsepower	Rated input capacity (10^6 BTU/Hr.)	Other rating (specify capacity and units)
	LC-o1			2.3	

Serial no.	Date constructed	Date manufactured	Date of last modification (explain in comments below)

** Source with a common stack will have the same stack number.
*** Cyclone, spreader (with or without reinjection), pulverized (wet or dry bottom, with or without reinjection), other stoker (specify type, hand fired, automatic, or other type (describe below in comments).

FUEL USED IN BOILER, BURNER, GENERATOR, OR SIMILAR FUEL BURNING SOURCE

8. Fuel data: (Complete for a process source with in process fuel or a non-process fuel burning source)

Primary fuel type (specify)

Standby fuel type(s) (specify)

Fuels used	Annual usage	Hourly usage		%	%	BTU value		(For APC use only)
		Design	Average	Sulfur	Ash	of fuel		SCC code
Natural gas:	10^6 Cu. Ft.	Cu. Ft.	Cu. Ft.	/ / / / / / / /	/ / / / /	1,000		
#2 Fuel oil:	10^3 Gal.	Gal.	Gal.		/ / / / /			
#5 Fuel oil:	10^3 Gal.	Gal.	Gal.		/ / / / /			
#6 Fuel oil:	10^3 Gal.	Gal.	Gal.		/ / / / /			
Coal:	Tons	Lbs.	Lbs.					
Wood:	Tons	Lbs.	Lbs.	/ / / / / / / /	/ / / / /			
Liquid propane:	10^3 Gal.	Gal.	Gal.	/ / / / / / / /	/ / / / /	85,000		
Other (specify type & units): CHyP gas		100 ft3/min	100			385 Btu/ft3		

9. If Wood is used as a fuel, specify types and estimate percent by weight of bark

10. If Wood is used with other fuels, specify percent by weight of wood charged to the burner.

11. Comments

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NON-TITLE V PERMIT APPLICATION
FACILITY IDENTIFICATION

Please type or print and submit in duplicate for each emission source. Attach appropriate source description forms.

SITE INFORMATION

1. Organization's legal name Proton Power, Inc.		For APC use only	APC Company point no.
2. Site name (if different from legal name)			APC Log/Permit no.
3. Site address (St./Rd./Hwy.) 210 Sam Rayburn Parkway			County name Roane
City or distance to nearest town Lenoir City	Zip code 37771		**4.** NAICS or SIC code 2869
5. Site location (in lat. /long.)	Latitude 35.888587		Longitude -84.344142

CONTACT INFORMATION (RESPONSIBLE PERSON)

6. Responsible person/Authorized contact Sally Almond			Phone number with area code 865-312-3859
Mailing address (St./Rd./Hwy.) 487 Sam Rayburn Parkway			Fax number with area code
City Lenoir City	State tn	Zip code 37771	Email address salmond@protonpower.com

CONTACT INFORMATION (TECHNICAL)

7. Principal technical contact Sally Almond			Phone number with area code
Mailing address (St./Rd./Hwy.) same			Fax number with area code
City	State	Zip code	Email address

CONTACT INFORMATION (BILLING)

8. Billing contact Jane Sharp			Phone number with area code 865-376-9002
Mailing address (St./Rd./Hwy.) 487 Sam Rayburn Parkway			Fax number with area code
City Lenoir City	State tn	Zip code 37771	Email address jsharp@protonpower.com

EMISSION SOURCE INFORMATION

9. Emission source no. (number which uniquely identifies this source)
LC-02

10. Brief description of emission source
Dried biomass will be processed in a crumbler to reduce particle size and generate CHyP unit.

11. Normal operation:	Hours/Day 8	Days/Week 7	Weeks/Year 52	Days/Year 365
12. Percent annual throughput	Dec. – Feb. 25	March – May 25	June – August 25	Sept. – Nov. 25

(Over)

TYPE OF PERMIT REQUESTED

13. Operating permit ( )	Date construction started	Date completed	Last permit no.	Emission source reference number
Construction permit (X)	Last permit no.		Emission source reference number	

If you choose Construction permit, then choose either New Construction, Modification, or Location transfer

	New Construction (X)	Starting date May 15, 2016	Completion date
	Modification ( )	Date modification started or will start	Date completed or will complete
	Location transfer ( )	Transfer date	Address of last location

14. Describe changes that have been made to this equipment or operation since the last construction or operating permit application:

SIGNATURE

Based upon information and belief formed after a reasonable inquiry, I, as the responsible person of the above mentioned facility, certify that the information contained in this application and any attached application(s) is accurate and true to the best of my knowledge. As specified in TCA Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

15. Signature (application must be signed before it will be processed)		**Date**
Sam C Weaver, Pres.		4/25/16
Signer's name (type of print)	**Title**	**Phone number with area code**
Sam C. Weaver	President	865-376-9002

Table of Pollution Reduction Device or Method Codes

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EMISSION POINT DESCRIPTION

Please type or print and submit in duplicate for each stack or emission source. Attach to the Non-Title V Facility Identification Form (APC 100).

GENERAL IDENTIFICATION AND DESCRIPTION

1. Organization name Proton Power, Inc		For APC use only	APC Company point no.
2. Emission source no. (As on Non-Title V Facility Identification Form) LC-02	Flow diagram point number		APC Log/Permit no.
3. Brief emission point description (Attach a sketch if appropriate): Dried biomass will be passed through a crumbler for uniform size reduction prior to being fed into the CHyP test unit. The crumbler will be manually fed. This system will be located inside the building, there is no stack associated with this operation.			Distance to nearest property line (Ft.) 500

STACK AND EMISSION DATA

4. Stack or emission point data: →	Height above grade (Ft.) 3	Diameter (Ft.) 0	Temperature (°F) ambient	% of time over 125°F 0	Direction of exit (Up, down or horizontal)
Data at exit conditions: →	Flow (actual $Ft.^3$/Min.) n/a	Velocity (Ft. /Sec.)	Moisture (Grains/$Ft.^3$)		Moisture (Percent)
Data at standard conditions: →	Flow (Dry std. $Ft.^3$/Min.)	Velocity (Ft. /Sec.)	Moisture (Grains/$Ft.^3$)		Moisture (Percent)

5. Air contaminants	Actual emissions						
	Emissions (Lbs./Hr.)						
	Average	Maximum	Concentration	Avg. emissions (Tons/Yr.)	Emissions est. method code	Control devices *	Control efficiency%
Particulate matter	0.34	0.34	**	0.496	3	000	
Sulfur dioxide (SO_2)			***				
Carbon monoxide (CO)			PPM				
Organic compounds			PPM				
Nitrogen oxides (NO_X)			PPM				
Fluorides							
Greenhouse gases (CO_2 equivalents)							
Hazardous air pollutant (specify)							
Hazardous air pollutant (specify)							
Other (specify) THC							
Other (specify) VOCs							
Other (specify)							

(Over)

6. Check types of monitoring and recording instruments that are attached: Opacity monitor ( ), SO_2 monitor ( ), NO_X monitor ( ), Other (specify in comments) ( )	
7. Comments	
8. Control device or Method code description:	Description of operating parameters of device (flow rate, temperature, pressure drop, etc.):

* Refer to the tables below for estimation method and control device codes.

** Exit gas particulate matter concentration units: Process – Grains/Dry Standard Ft^3 (70^0F), Wood fired boilers - Grains/Dry Standard Ft^3 (70^0F), all other boilers – Lbs. /Million BTU heat input.

*** Exit gas sulfur dioxide concentrations units: Process – PPM by volume, dry bases, and boilers – Lbs. /Million BTU heat input

Table of Pollution Reduction Device or Method Codes
(Alphabetical listing)

Note: For cyclones, settling chambers, wet scrubbers, and electrostatic precipitators; the efficiency ranges correspond to the following percentages:
High: 95-99+%. Medium: 80-95% And Low: Less than 80%.
If the system has several pieces of connected control equipment, indicate the sequence. For example: 008'010.97%
If none of the below codes fit, use 999 as a code for other and specify in the comments.

No Equipment....000
Activated Carbon Adsorption....048
Afterburner – Direct Flame....021
Afterburner – Direct Flame with Heat Exchanger....022
Afterburner – Catalytic....019
Afterburner – Catalytic with Heat Exchanger....020
Alkalized Alumina....040
Catalytic Oxidation – Flue Gas Desulfurization....039
Cyclone – High Efficiency....007
Cyclone – Medium Efficiency....008
Cyclone – Low Efficiency....009
Dust Suppression by Chemical Stabilizers or Wetting Agents 062
Electrostatic Precipitator – High Efficiency....010
Electrostatic Precipitator – Medium Efficiency....011
Electrostatic Precipitator – Low Efficiency....012
Fabric Filter – High Temperature....016
Fabric Filter – Medium Temperature....017
Fabric Filter – Low Temperature....018
Fabric Filter – Metal Screens (Cotton Gins)....059
Flaring....023
Gas Adsorption Column -- Packed....050
Gas Adsorption Column – Tray Type....051
Gas Scrubber (General: Not Classified)....013
Limestone Injection – Dry....041
Limestone Injection – Wet....042
Liquid Filtration System....049
Mist Eliminator – High Velocity....014
Mist Eliminator – Low Velocity....015
Process Change....046
Process Enclosed....054
Process Gas Recovery....060
Settling Chamber – High Efficiency....004
Settling Chamber – Medium Efficiency....005
Settling Chamber – Low Efficiency....006
Spray Tower (Gaseous Control Only)....052
Sulfuric Acid Plant – Contact Process....043
Sulfuric Acid Plant – Double Contact Process....044
Sulfur Plant....045
Vapor Recovery System (Including Condensers, Hooding and Other Enclosures)....047
Venturi Scrubber (Gaseous Control Only)....053
Wet Scrubber – High Efficiency....001
Wet Scrubber – Medium Efficiency....002
Wet Scrubber – Low Efficiency....003
Wet Suppression by Water Sprays....061

Table of Emission Estimation Method Codes

Not application / Emissions are known to be zero....0
Emissions based on source testing....1
Emissions based on material balance using engineering expertise and knowledge of process....2
Emissions calculated using emission factors from EPA publications No. AP-42 Compilation of Air Pollution Emissions Factors....3
Judgment....4
Emissions calculated using a special emission factor different from that in AP-42....5
Other (Specify in comments)....6